

We claim:

1. A device for ultrasonic interrogation from a skin interrogation site, comprising:
- a) a holder for an ultrasonic probe adapted for skin-interrogation of tissues subjacent to a skin interrogation site, said holder is adapted to fit at least an interrogation surface of said ultrasonic probe, and said holder includes 1) a securing portion for securing said holder to said ultrasonic probe and 2) an interrogation window in acoustic alignment with at least a section of said interrogation surface, and
- b) a sonolucent film covering said interrogation window.
2. The device of claim 1, wherein said holder is made of a holder-polymeric material and said sonolucent film is made of a sonolucent-polymeric material.
3. The device of claim 2, wherein said sonolucent-polymeric material is more flexible than said holder-polymeric material.
4. The device of claim 3, wherein said sonolucent film is heated welded or sealed to said holder.
5. The device of claim 3, wherein said holder-polymeric material is a rigid, injection molded polymer.
6. The device of claim 1, wherein said interrogation window is made of a rigid polymer with a substantially planar surface that holds said sonolucent film.
7. The device of claim 6, wherein said sonolucent film is a substantially planar interrogation surface.
8. The device of claim 6, wherein said sonolucent film has a substantially planar interrogation surface after an ultrasonic probe is inserted into said holder.
9. The device of claim 1, wherein said sonolucent film is an acoustic coupling material made of a pliable polymer matrix.
10. The device of claim 9, wherein said sonolucent film includes an applied gel on said sonolucent film's exterior interrogation-side to enhance acoustic communication.

11. The device of claim 9, wherein said sonolucent film includes an applied gel on said sonolucent film's interior interrogation-side to enhance acoustic communication.
12. The device of claim 1, wherein said interrogation window is a molded portion of said holder.
13. The device of claim 12, wherein said interrogation window is of about the same surface area as said interrogation surface of said ultrasonic probe for which said holder is designed.
14. The device of claim 13, wherein said holder further comprises securing members for securing said holder to said ultrasonic probe.
15. The device of claim 12, wherein said holder and said sonolucent film are comprised of one acoustic coupling material and said holder has a region with a cross sectional thickness greater than said sonolucent film's cross sectional thickness.
16. The device of claim 13, further comprising an ultrasound probe adapted to fit said holder.
17. The device of claim 15, wherein said interrogation window is about 10 cm² or less in surface area.
18. The device of claim 1, wherein said holder is made of a molded plastic and is contained in a hygienic container to protect it from contamination prior to use.
19. The device of claim 1, further comprising a plurality of said holders wherein each holder has an exterior contour and an interior contour and said exterior contour is designed to fit into said interior contour.
20. A device, comprising a stack of holders for ultrasonic probes, each holder comprises an exterior region and an interior region, and 1) said exterior region is adapted to fit into said interior region, 2) said interior region is adapted to fit into said exterior region or 3) said exterior region is adapted to fit into said interior region and said interior region is adapted to fit into said exterior region.
21. The device of claim 20, wherein each said holder has an exterior interrogation surface and said device further comprises a plurality of acoustic coupling gel

exterior layers, each exterior layer comprises a machine applied, predetermined volume of acoustic coupling gel on a plurality of said exterior interrogation surfaces.

22. The device of claim 20, wherein each said holder has an interior interrogation surface and said device further comprises a plurality of acoustic coupling gel interior layers, each interior layer comprises a machine applied, predetermined volume of acoustic coupling gel on a plurality of said interior interrogation surfaces.

23. The device of claim 22, wherein each said holder has an exterior interrogation surface and said device further comprises a plurality of acoustic coupling gel exterior layers, each exterior layer comprises a machine applied, predetermined volume of acoustic coupling gel on a plurality of said exterior interrogation surfaces.

24. The device of claim 23, further comprising a plurality of removable films in contact with said acoustic coupling gel exterior layer, wherein said removable films help prevent contamination of said exterior layer.

25. The device of claim 20, wherein each said holder has an exterior interrogation surface and said device further comprises a plurality of caps, each cap is adapted to fit and sized to said exterior interrogation surface.

26. The device of claim 25, wherein each cap further comprises a machine applied, predetermined volume of acoustic coupling gel and said acoustic coupling gel is in acoustic contact with said exterior interrogation surfaces.

27. The device of claim 26, wherein each cap further comprises a machine applied, predetermined volume of acoustic coupling gel and said acoustic coupling gel is in acoustic contact with said exterior interrogation surfaces.

28. The device of claim 27, wherein each cap further comprises a hydrophobic surface in contact with said acoustic coupling gel, wherein said hydrophobic surface helps prevent said acoustic coupling gel from adhering to said cap.

29. The device of claim 26, wherein said holders and caps are a molded plastic.

- Sub 03
30. A device, comprising a removable holder for an ultrasound probe, said removable holder comprising a proximal region for interrogation of an exterior interrogation surface, said proximal region is adapted for acoustic alignment with an ultrasound source or detector, said proximal region includes an interrogation surface that permits interrogation with an ultrasound probe and a distal region slidably engagable with said ultrasound probe while maintaining said acoustic alignment.
31. The device of claim 30, wherein said proximal region is molded.
32. The device of claim 30, wherein said interrogation surface is a film that passes ultrasonic waves.
33. The device of claim 32, wherein said film is more rigid than a polyurethane film of about 2 mil, and made of a polymer that passes at least 90 percent of ultrasonic waves reaching said film's surface.
34. The device of claim 30, wherein a portion of said film maintains a substantially planar surface without insertion of an ultrasound probe into said removable holder.
35. The device of claim 30, wherein said distal region is molded.
36. The device of claim 30, wherein said distal region is made of a rigid plastic.
37. The device of claim 36, wherein said distal region further comprises friction engagable nibs to grasp said ultrasound probe.
38. The device of claim 37, wherein said friction engagable nibs include an entry angle that is mechanically compatible with a friction engagable depression or depressions on said ultrasound probe.
39. The device of claim 36, wherein said distal region further comprises at least one friction engagable depression to grasp said ultrasound probe.
40. The device of claim 37, wherein said at least one friction engagable depression include an entry angle that is mechanically compatible with a friction engagable nib on said ultrasound probe.
41. The device of claim 40, further comprising an ultrasound probe with at least one friction engagable nib that is mechanically compatible with said at least one friction engagable depression.

42. The device of claim 36, wherein said distal region further comprises a contractible and expandable sizing element to grasp said ultrasound probe.
43. The device of claim 42, wherein said contractible and expandable sizing element is made of an elastomeric material.
- 5 44. The device of claim 30, wherein said interrogation surface includes an interior surface with an acoustic coupling gel of known volume.
45. The device of claim 44, wherein said interrogation surface is made of an acoustic coupling material selected from the group consisting of polyethylenes, polymethylpentenes, polyurethanes, and cyclo-ofelins.
- 10 46. The device of claim 44, wherein said known volume is of sufficient volume to permit acoustic contact with said interrogation surface to individually and separately accommodate an ultrasound probe selected from a collection of ultrasound probes of different volumes.
47. The device of claim 44, wherein said distal region is made of a material selected from the group consisting of polycarbonates, polystyrenes, polyethylenes, polyvinyl chlorides, and polypropylenes.
- 15 48. The device of claim 48, wherein said distal region is made of a rigid polymer.
49. The device of claim 30, wherein said distal region is made of a rigid polymer and said distal region further comprises a probe engager to engage said ultrasound probe.
- 20 50. A device for manufacturing ultrasound related devices or ultrasonically testing surfaces, comprising
- a) an acoustic coupling fluid dispenser to dispense acoustic coupling fluid on a surface with a subjacent layer or layers,
- 25 b) an ultrasound source,
- c) an ultrasound detector located to receive ultrasound waves from said ultrasound source that are transmitted through said surface or reflected from said surface, wherein said device is useful for testing surfaces for ultrasonic properties.

51. The device of claim 50, further comprising a transfer system to transfer said surface to and from said acoustic coupling fluid dispenser.
52. The device of claim 51, wherein said transfer system is a conveyor based system and said ultrasound source is located to transmit said ultrasound waves through a plane of said transfer system to said ultrasound detector.
53. The device of claim 51, wherein said ultrasound detector can detect ultrasound signals from substantially all of said surface.
54. The device of claim 50, further comprising a computational unit that instructs said ultrasound source and detector.
55. The device of claim 54, wherein said computational unit determines whether a structural abnormality exists in said surface.
56. The device of claim 54, wherein said detector is adapted to measure ultrasound signals that have been transmitted through said surface.
57. The device of claim 54, wherein said computational unit estimates or determines one or more of the following ultrasonic properties of said surface or said layer or said layers: 1) BUA, 2) SOS, 3) reflective distance, echogenicity, percent transmission, percent transmission as a function of location of said surface and amplitude analysis.
58. The device of claim 50, wherein said surface is on an ultrasound probe holder.
59. The device of claim 50, wherein said surface is part of one or more of the following structures: 1) a sealed compartment containing a fluid, 2) a film that in the absence of an abnormality permits passage of at least about 75% of ultrasonic waves at a frequency of between about .1 and 30 MHz, 3) a film with a layer of acoustic coupling liquid, or 4) a liquid in a container.
60. An injection molded device, comprising a rigid, plastic holder for an ultrasound source or detector, said rigid, plastic holder is of a generally predetermined shape and three dimensional dimensions without an inserted ultrasound source or detector, said rigid, plastic holder comprising an interrogation region for interrogation of an exterior interrogation surface, said interrogation region is dimensioned to snugly fit over a housing for said ultrasound source or detector

while permitting interrogation through said interrogation region and said interrogation region engages with said housing.

61. The injection molded device of claim 60, further comprising a machine applied acoustic gel layer on said interrogation region to facilitate acoustic coupling between said interrogation region and said ultrasound source or detector.
62. The injection molded device of claim 60, further comprising a cap that snugly fits over said interrogation region intended to be in contact with said exterior interrogation surface.
63. A device for manufacturing ultrasound related devices, comprising:
- a) an acoustic coupling fluid dispenser to dispense a selected volume of an acoustic coupling fluid on an acoustically transmissible solid substrate, said acoustic coupling fluid dispenser comprising an orifice in liquid communication with reservoir, said acoustic coupling fluid is emitted from said orifice and
 - b) a transfer system to transfer said acoustically transmissible solid substrate to a predetermined location in geometric register with said orifice to permit said orifice to emit said acoustic coupling fluid onto said acoustically transmissible solid substrate.
64. The device for manufacturing ultrasound related devices of claim 63, further comprising an ultrasound detection system to detect the distribution of said acoustic coupling fluid onto said acoustically transmissible solid substrate.
65. The device for manufacturing ultrasound related devices of claim 63, further comprising a second acoustic coupling fluid dispenser to dispense a selected volume of an acoustic coupling fluid on additional acoustically transmissible solid substrates, said second acoustic coupling fluid dispenser comprising a second orifice in liquid communication with reservoir, said acoustic coupling fluid is emitted from said second orifice.
66. The device for manufacturing ultrasound related devices of claim 63, further comprising a computational unit to manage workflow to said acoustic coupling fluid dispenser through said transfer system.

67. The device for manufacturing ultrasound related devices of claim 63, wherein said acoustic coupling fluid dispenser and said transfer system can process at least about 1,000 acoustically transmissible solid substrates per hour.

68. The device for manufacturing ultrasound related devices of claim 63, wherein said acoustic coupling fluid dispenser can dispense a gel.

69. The device for manufacturing ultrasound related devices of claim 63, wherein said acoustic coupling fluid dispenser can dispense a volatile acoustic coupling liquid.

70. A device, comprising:

- Sub (B5)
- a) a rigid, plastic holder for an ultrasound source or detector, said rigid, plastic holder is of a generally predetermined shape and three dimensional dimensions without an inserted ultrasound source or detector, said rigid, plastic holder comprises an interrogation region for interrogation of an exterior interrogation surface, said interrogation region is dimensioned to snugly fit over a housing or frame for said ultrasound source or detector while permitting interrogation through said interrogation region and said interrogation region engages with said ultrasound source or detector housing or frame.
 - b) an ultrasound probe mechanically compatible with said rigid, plastic holder, and
 - c) an ultrasound system for ultrasound interrogation, signal processing and conveyance of interrogation information.

71. A therapeutic kit, comprising:

- a) an interrogation device of one of the foregoing claims, and
- b) a health care product in at least one dosage or a medical treatment;

wherein said interrogation device can assist in monitoring a therapeutic effect of said at least one dosage.

72. The therapeutic kit of claim 71, wherein said health care product produces water loss.

73. The therapeutic kit of claim 71, wherein said health care product is a drug selected from the group consisting of antiarrhythmics, anticholinergics, antihypertensives,

alpha- and beta-adrenergic blockers, calcium channel blockers, cardiac glycosides, hydantoin derivatives, and nitrates.

74. The therapeutic kit of claim 71, wherein said health care product is a drug selected from the group consisting of diuretics such as aldosteron antagonists, carbonic anhydrase inhibitors, loop diuretics and thiazides or thiazide-like agents.

5
sub B6) 75. An device, comprising a rigid, plastic holder for an ultrasound source or detector, said rigid, plastic holder is of a generally predetermined shape and three dimensional dimensions without an inserted ultrasound source or detector, said rigid, plastic holder comprises an interrogation region for interrogation of an exterior interrogation surface, said interrogation region is dimensioned to snugly fit over a housing or frame for said ultrasound source or detector while permitting interrogation through said interrogation region and said interrogation region engages with said ultrasound source or detector housing or frame.

10
76. The device of claim 75, wherein said ultrasound source or detector is adapted for in situ ultrasound measurements.

15
77. The device of claim 76, wherein said rigid, plastic holder is adapted for securing an acoustic coupling material to a surface of an object or subject for in situ ultrasound measurements.

20
78. The device of claim 77, wherein said acoustic coupling material has an adhesive coating or adhesive properties.

25
79. The device of claim 78, wherein said coupling material has a surface area of about 1cm^2 or less.

80. The device of claim 77, wherein said coupling material has a surface area of about 2cm^2 or less.

81. The device of claim 75, wherein said rigid, plastic holder further comprises a covering to protect said ultrasound source or detector from contamination.

add B7